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# ADDRESS

BY

HON. WM. J. McALPINE,

BEFORE

## THE CHAMBER OF COMMERCE,

AT THE COOPER UNION,

ON THE EXTENT OF THE PRODUCTS OF THE FOOD-PRODUCING INTERIOR OF THE UNITED STATES. THE CHANNELS OF TRANSPORT TO MARKET: THEIR RELATIVE CAPACITY AND ECONOMY: WHAT IMPROVEMENTS OR NEW ROUTES MAY BE MADE TO INCREASE AND CHEAPEN TRANSPORT, AND HOW THESE MAY BE MADE CONDUCTIVE TO THE INTERESTS OF

THE MERCHANTS AND CITIZENS OF NEW YORK CITY,

MAY 8th, 1873.



New York:

JOHN W. AMERMAN, PRINTER

No. 47 CEDAR STREET.

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# ADDRESS

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HON. WILLIAM J. McALPINE.

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MR. PRESIDENT and GENTLEMEN OF THE CHAMBER OF COMMERCE:—In complying with your request to address the Merchants of New York, it is gratifying to know that the subject which I propose to consider, is one to which your own attention has been often directed, concerning which many of you are so well informed, and predisposed to look with indulgence upon any defects in its treatment, when perceiving an honest effort after truth.

Although my audience is composed of the Merchants of this City, my subject is not of a local character, but embraces the most diversified interests; for in truth no one can regard with indifference the facilities of transportation by which the products of agriculture and mechanical industry are rendered more accessible, and the time and cost lessened to all who participate in the interchange of these commodities.

One of the most interesting pages of Gibbon, is his description of the magnificent highways for transportation which formed the principal means both for the attainment and preservation of the Conquests of Rome, which extended from the Forum to the most distant frontier, and which were so permanently constructed that the lapse of fifteen centuries has not been sufficient to destroy them.

I have seen on the Danube, the remains of a highway, constructed by Trajan in the Second Century, forming a shelf for many miles, cut out of the face of the rock cliffs before gunpowder was known.

A modern McAdam turnpike on the opposite side of the river now supplies the place of this old Roman road. There are also at the same place near Turkey, the remains of a Canal, larger than the Erie, built by the same Roman Emperor, and I was re-



cently called upon to make the examination for a water channel over the same route as the ancient canal. Such Highways and Bridges are found wherever that Great Nation extended its sway.

No one need be told that the primary object in the construction of these great highways was a military one. But this purpose sinks in our estimation when we contemplate others, once deemed of secondary importance, and consider them as the vehicles for the exchange of productions and the means of gradually introducing the arts and civilization of the conquered into the country of the conquerors.

A very striking effect of the benefit of these channels of transportation is adduced by the historian, in the fact that after they were established the famines which were formerly so often the scourge of Republican Rome, were seldom or never experienced under the Empire. "A scarcity in any single province was relieved by the plenty of its more fortunate neighbors."

In every country, the number, extent, and condition of its roads and canals, furnish, if not the only criterion, at least a very good one, of the civilization of its people, and the power of its Government.

If ever the British Empire in India perishes, such public works as the irrigation canals and the grand trunk railroads connecting the coast with the interior, will present the most striking monuments of the former civilized rule, so singularly introduced, so long and stubbornly maintained, and, upon the whole, so beneficently administered. The number of similar public works in our own country, their extent, the vast amount of capital invested in them, the multitudes to whom they give employment, and the skill and perseverance, in many cases, displayed in overcoming the obstacles to their construction, must in like manner be regarded as among the highest and most satisfactory evidences of American genius and enterprise.

The field of our present inquiry is a broad one, embracing the extent of the trade between the food-producing interior and the consuming and exporting sections of the Atlantic slope—the existing channels by which this trade is conducted—their capacity and the cost of transport thereon—what improvements and en-

largements may be advantageously made—what new channels may be profitably opened to meet the existing and future demands of the trade between these sections and lessen the cost of transportation, and how these improvements and new works may be rendered conducive to the interests of the merchants and citizens of New York.

My experience as a Manager of our State Canals, as a Railroad Commissioner, as the Acting President of the Erie Railway at the East, and of several important lines at the West, will, I hope, enable me to bring practical knowledge to bear upon the questions involved.

The territory, the trade of which is now to be considered, is the basin of the Great Lakes and of the Upper Mississippi.

This area contains one-third of the population of the Republic, produces an annual cereal crop of nine hundred millions of bushels, and with the products of pastoral agriculture gives an annual tonnage for export from that region of ten or twelve millions a year.\* The statistics of Ontario, Canada, are not included, on account of the unreliability of the estimates which have been made, and none others of recent date have been available to me, and probably do not exist.

One of the remarkable physical features of the North American Continent is the existence of a plateau nearly in its geographical centre, on the north line of Minnesota, from which navigable streams flow into three great oceans.

This plateau is scarcely two thousand feet above the level of the sea, and from it flows *southerly* the Mississippi River, with a continuous natural navigation of two thousand miles; the chain of great Lakes *eastwardly*, with a continuous natural and artificial navigation of two thousand five hundred miles to the Atlantic; *northerly*, a natural but not continuous navigation of one thousand miles to Hudson Bay and the Arctic Sea; and *westwardly*, the Columbia River, with a species of natural navigation to the Pacific.

The territory lying to the south and east of this remarkable plateau, in the salubrity of its climate, in the fertility of its soil, in its varied productions, and in its extent and ready access to

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\* See Appendix.

the great markets of the world, combines advantages superior to any other portion of the globe.

Its discovery, settlement and development have followed each other so rapidly, that its history must be written annually, to keep pace with its progress, or to form a basis of an adequate estimate of its future importance and influence upon the trade and commerce of the world.

That portion of the territory referred to, which affects the question now proposed for discussion, embraces the ten North-western States and Western Canada; and we shall soon have to add to it the metalliferous districts of the mountains and of the Pacific States, with a portion of the trade of the Indies.

I have called your attention to this *plateau*, lying eight degrees to the north of us, in the latitude of Newfoundland; and it might naturally be inferred that it possessed the same inhospitable climate.

Far from it.

Its Summer temperature corresponds with that of Central Europe, London, Paris, Berlin and Vienna. The southern dent corn (which cannot be grown in this State) ripens here, and I have seen the rude "Red River carts" coming into St. Paul with wheat grown hundreds of miles further North; and the isothermal charts show that, although five hundred miles North of us, it has as genial a climate as ours, and therefore that we may count upon the whole of the territory southward as tributary to our commerce.

Limiting this area on the South by the basin of the Ohio, and on the West by the basin of the Missouri, it contains five hundred thousand square miles and a population of fourteen millions, with forests of the finest timber, mines of the most useful minerals, and a soil producing the largest crops of the most valuable cereals.

The natural advantages of this interior district, situated at from one to two thousand miles from the Ocean, would have been almost valueless, except for the magnificent navigable water lines which surround and penetrate it, literally to the centre of the Continent, and furnish so cheap a transport for the immense commerce which has grown up between it and the great markets of the world.

Seventy years ago this region contained only scattered forts and trading posts;—*now* it has one-third of the population of the nation.

The world has never before witnessed such vast movements of “peoples” as have in this century flowed westward, and subsided upon this area. The migrations of the earlier ages were of savage hordes upon civilization—to lay waste and barbarize. This has been a migration of industry, intellect and wealth, to subdue a wilderness by the axe and plough.

This wave of population has heretofore been rolling westward in such volume, as to abstract in that direction a large portion of the surpluses of its teeming soil; but as it has moved forward, step by step, have we at the East felt its influence upon our channels of trade?

As soon as Ohio could feed the first year's demand of the emigration beyond it, the surplus crops of Western New York were turned eastward; and as those new settlers towards the Mississippi began to raise surpluses, the districts East of them successively contributed their quotas to the immense commerce, which we see to-day, filling up all of the channels of trade to their utmost capacity.

It is not surprising that the sagacious minds of other sovereignties should have been attracted to the rich prize which the trade of this vast interior offered!

The States of Pennsylvania and Virginia, as well as the Canadas, eagerly entered the field of competition, and have constructed immense works to secure their portions of it, while corporate enterprise has built great lines of railways to penetrate the interior, and to tap their natural navigable water lines.

These natural lines are as follows:

*First.*—The chain of great Lakes and the St. Lawrence, bifurcating to Quebec, and by Lake Champlain and the Hudson to New York.

*Second.*—The Ohio River, and by portages over the mountains to the Susquehanna, Chesapeake and James.

*Third.*—The Mississippi and its navigable tributaries, terminating on the Gulf of Mexico.

Each of these (except the last) have been improved by artificial works.

The great Trunk Railways extend from all of the important interior centres of trade to the Atlantic:

*First.*—Through the Canadas, to Quebec and Portland;

*Second.*—Through this State, by two lines, to New York and Boston;

*Third.*—Through Pennsylvania to Philadelphia;

*Fourth.*—Through Maryland to Baltimore; and

*Fifth.*—Through the Southern States to all their Atlantic and Gulf ports.

These natural water lines and the artificial ones, as well as the railroads before named (all of them beyond the Alleghanies, and included within the basins of the Lakes, and the Ohio, Mississippi and Missouri Rivers), form connected lines of navigation of sixteen hundred miles by lake, seven thousand miles by rivers, sixteen hundred miles by canals, and ten thousand miles by railways.

Immediately west of the State of New York lies the great basin of the Lakes, and contiguous to it on the south and west, lie the Ohio and Upper Mississippi basins, of equal magnitude. These basins are separated from the Atlantic by the Alleghany Mountains, except where they fall off to the level plains extending through the centre of New York.

An inspection of the maps embracing these basins, shows on the one side, the chain of great Lakes from the further extremity of Superior, trending *southeasterly* to the lower end of Lake Erie; and on the other side, the Ohio River, from its junction with the Mississippi, trending *northeasterly* to its source in Western New York, and all of the intermediate natural water lines lead towards the same point.

This general direction of the natural water lines, has given the same course to the artificial water and railroad lines constructed through these basins, and concentrates in the narrow gorge lying between the northern slope of the Alleghany Mountains and the eastern end of Lake Erie, a drift of trade and travel which is not to be found elsewhere.

This concentrated traffic collected by the fan-spreading lines, hitherto has been conveyed between the Lakes and the Atlantic, through the Erie Canal and the central and southern lines of rail-

roads in this State, to its commercial emporium, from whence it was distributed by the ocean lines of steamers and sail vessels, to every part of the globe.

I beg to say in regard to our rival lines :

*First.*—That the winter rigors of the Canadian outlet to the Atlantic—its intricate navigation and fogs—are seriously to its disadvantage.

*Second.*—That the long route by the Mississippi, though cheap, carries Western products too far out of the great lines of trade : and its torrid climate is so injurious to many of these products that that route is also less advantageous.

*Third.*—That the elevation of the water portages which Pennsylvania and Virginia have to overcome, are so much more costly than ours ; and

*Fourth.*—While the railway lines above designated, including any that *can* be made, involve a cost of transport so much exceeding that of the improved and projected canals, connecting, by the shortest portages, the interior water lines of the West with the tidal waters of the Atlantic, that we can, as we have always heretofore done, offer to the Western producer, the cheapest and best route to the seaboard.

While thus congratulating ourselves upon our geographical advantages, we must not forget that the prize sought for is of too much intrinsic value, and too tempting to be yielded to us without a struggle ; and that modern progress overcomes all of the supposed real advantages of an effete and supine community.

It is difficult to realize the importance of the Erie Canal, which now conveys one-fourth of the exports of that vast interior region which I have described, and as much of it, during its six months of uninterrupted navigation, as all of the trunk railways together during the same time.

Every canal boat which comes to tide-water with an average cargo contains more than the average of the Railroad trains.

In the busy canal seasons, more than one hundred and fifty such boats come daily to tide-water, and none of the Railroads exceed thirty trains per day.

Such a canal traffic would require more than twenty miles of railroad cars ; and there is neither room nor conveniences for discharging one-fourth as many.

The slow, plodding canal boat attracts no attention, while the bustle, noise and whirl of a freight train, creates a sensation in every village through which it passes.

The locks on the canals act as regulators of the boats, which are separated by the distance which they would move during one lockage; and hence the canal business proceeds methodically, and gives no idea of its great volume. Nor is this appreciated until some stoppage occurs, and then a delay of twenty-four hours will accumulate hundreds of boats; enough to fill the track of the New York Central half way from Albany to New York.

Imagine, if you can, what would be the effect of a catastrophe that should stop the navigation of the canals for one season.

All of the New York roads could not transport one-half, and the entire capacity of all of the roads to the seaboard in their present condition would be insufficient to convey the whole of it.

Half the merchants of New York, connected directly or indirectly with this canal traffic, would be bankrupted, and their rivals in Portland, Boston, Philadelphia and Baltimore would be correspondingly benefitted.

Many of you, gentlemen, here present, know better than I do how much the delays of the canals, increase the cost of transportation, as well as the losses suffered by the Merchants and by the State therefrom.

And how much of the business that we ought to do is turned into the rival channels of neighboring States, because of our incapacity under such circumstances to carry it?

The value of the Erie Canal to the interests of the whole State, although generally acknowledged, has been so often ignored or covered up with sophism, that it cannot too often be urged upon the attention of our citizens.

In a thousand insidious ways is this opposition to it exhibited. At one time, under the cries of "enthusiasm, ruin of State credit, ignorance of the new elements of transport, and squandering of public money," has a Clinton, a Bouck, a Jervis or a Ruggles been placed under a temporary cloud.

How completely has the prescience of these great men been vindicated by subsequent results!

The Canals of New York, with one exception, have been built

by the State, and the Railways by Corporations, and form a connected system, which ramifies the whole State, and extends its beneficial influences to every section.

As before stated, the Erie Canal is the great artery of this system.

The Trunk Railways are the adjuncts, and their branching lines are tributary to these trunks, or to the canals.

Besides these artificial lines of transport, this State borders on the Atlantic, and sends ships to every clime and nation. Within its boundaries flows the Hudson, which bears upon its bosom a tonnage greater than the foreign trade of the nation. At its western extremity terminates the great chain of lakes, which penetrates to the heart of the continent, and on which floats a mercantile navy equal to that of the greatest European powers.

Without the port of New York this State would not have been the "Empire" of the nation.

Without the Lakes at the West, the Hudson at the East, and the connecting canals, New York City would never have been the commercial metropolis of the Union.

Without her magnificent canals and railways, New York would have "lost caste among her sister States;" and without the radiating lines of the secondary railways, the progress of her interior development would have been left in the rear of the world's development.

When Clinton, Jervis and Ruggles predicted the volumes of trade over our public works, they were regarded as "*honest* enthusiasts," but neither they nor the host of other far-seeing men, who have advocated the construction and enlargement of our great trunk lines of canals and railways, realized the enormous extent of this trade as it *now* exists, nor as it will continue to develope and increase year by year.

No commercial city of any importance has ever flourished, except where there occurs a break in the grand lines of transport—from the land to the water courses of the interior, and from the latter to the ocean.

By this rule, Quebec or Montreal, New York, Norfolk or Baltimore, and New Orleans, must be the great commercial centres



of the Atlantic; and Chicago, St. Louis and Pittsburg of the Interior.

New York alone possesses the necessary requirements, which have long been admitted, and have made her the great commercial city of the Continent. Nevertheless, there are causes in operation which threaten to destroy these advantages, and to turn large portions of her trade to rival ports.

If it were true that the Railways are destined to absorb the interior transportation of the country, New York would have almost no advantages over the other Atlantic ports. And if the Erie Canal is superseded as a carrier by the cheap St. Lawrence, or Kanawha (Virginia) water lines, and no substitute can be found, her supremacy is gone.

Whatever may be said or done, the cheapest line of transport will carry the coarse agricultural products, and where they are sold, there will be the deposits of merchandise awaiting purchase with the proceeds of the sale of these products.

The consumption of the cereals, in New England and the Middle States, is about twice as much as that exported to foreign countries;\* that is, two-thirds of the Western trade is subject to a diversion by the cheapest water-line of transport, and another considerable portion by the cheapest land lines. The Erie Canal has until recently brought the trade of the West to New York, and for many years has furnished the cheapest line of transport; but it has now reached a point where the railways have become formidable competitors for even its own legitimate business, combining, as they do, greater certainty and celerity of movement, with charges (during the season of navigation) but little higher than those of the Canal.\*

The cause which has produced this diversion of business from the Canals to the Railways, is mainly due to the fact that the latter is under individual management, while the former is controlled by politicians.

As the manager of several Railways at the West, where the direction and route of a large amount of transportation were controlled, I was never for a week without the presence of a solicitor of freights from one or the other of the New York Railways, and

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\* See Appendix.

in ten years of such active management, I never once had an application to direct our freight over the Erie Canal. All that took that line (and it was then of no inconsiderable amount) was from the sheer force or influence of its own merit.

The Railway Companies call into their service men of the highest order of ability, skill, experience and business tact, each for his most appropriate place. Contrast these with the qualifications of our Canal officers. If one of the best paying Railways in the country was entrusted to such management, its rivals in business would send it into bankruptcy in five years.

The result of the application of minds of such high order has been to bring up Railway construction and management to its highest state of development, and its cost of transport to a minimum, while on our State Canals you can hardly perceive one valuable improvement over that practised half a century ago. Horses still sluggishly tow the boats a mile an hour, on the Canal, while the *same boat* is towed by steam, on the Hudson at five times the speed and half the cost.

In this same half century steam has almost taken the place of cheap sailing packets, on the Ocean and Lakes, and more than ten thousand locomotives are daily whirling over sixty thousand miles of Railway.

No successful efforts have been made until last year, to apply steam power to canal towing. The Pharaohs were almost as far advanced as our Canal officers. *They* towed their boats through larger Canals than the Erie, by men; *we do it* by old horses.

While a member of the Canal Board, I introduced many resolutions for reducing the tolls upon the State Canals. They were strongly opposed, and but few of them prevailed. Now, when almost too late, low tolls have been adopted. It has required the experience of a quarter of a century to discover that the true interest of the State is to secure trade by, and not to merely obtain revenue from, the Erie Canal.

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NOTE.—I desire to express the opinion, that under no circumstances should the ownership or management of the main canals be allowed to pass out of the hands of the State. The Erie, Oswego and Champlain Canals are of too much importance (even under the worst management) to be hazarded by the liability (as in a sister State) of passing into the monopolizing hands of a grasping, rival Railway Company, whose interests would be to destroy them.

If the Erie Canal is moderately well managed, and its tolls adjusted merely to maintain it in the highest state of efficiency, and an economical system of steam towage is introduced, the immediate diversion of trade will be temporarily averted.

The time has arrived when it is necessary to give up the maintenance of the lateral canals, and no longer allow them to remain a tax upon the commerce of the State.

Three years hence, the Welland Canal enlargement will be completed, and vessels of twelve hundred tons will be able to come from the extremity of the Lakes (Chicago and Duluth), and discharge into canal boats at Oswego, materially cheapening the cost of transportation to New York.\*

It will be seen that the Erie Canal and its enlargement to Buffalo, while it has performed its functions and secured the Western trade to New York City, can no longer be used as a competitor of the Canadian route to Montreal.

The great through transportation now demands not only cheapness, but rapidity and certainty of delivery. The canal boat moved by horses cannot exceed a speed of one and a half miles an hour, and with steam, twice that velocity.

The large propellers on long voyages, can carry freight for two mills per ton per mile, with a speed of ten miles an hour on the lakes, eight on the rivers and three on the canals, exclusive of the time occupied in passing the locks, each of which may be considered as equal to a mile of extra distance.

With ships of 1,200 tons sailing from the middle of the Continent to Lake Ontario, and only 180 miles from tide water at Montreal, the enlarged Erie Canal from Oswego will hardly be able to successfully compete.

\* See Appendix.

NOTE.—Mr. Hatch is a faithful worker in behalf of the Canal from Buffalo, and his labors in favor of low tolls ought to be gratefully remembered.

There are many unnecessary expenses added to the cost of transport through Chicago, Buffalo, New York, and other places on the route. Excessive charges for handling, warehousing and draying at these places seriously injure the route as compared with some of its competitors.

It was remarked at a public meeting in a neighboring City, that "the cost of handling, warehousing, and drayage from the Railway depots in New York, exceeded the cost of transport to Liverpool." This statement, although an exaggeration, contains a great deal too much of truth to be overlooked.

A ship canal from Oswego to the Hudson, by which such ships could go to New York, becomes indispensable.

The other project is to convey such ships from the St. Lawrence River, ten miles west of Montreal, to Lake Champlain by a ship canal of thirty-five miles and no locks, and from the Lake to the Hudson by a similar canal with a few locks, and thence by a slack water navigation to tide water on the Hudson.

An expenditure of fifteen millions of dollars will accomplish this object, and permit vessels of over 1,000 tons cargo to come from the centre of the Continent, and discharge into ocean vessels without breaking bulk until they reach New York.\*

The comparison of the distances by these several routes is as follows:

From Chicago to Quebec.....	1,421 miles.
viz : of Lake and River Navigation.....	1,350
Canals (with 54 locks).....	71
From thence to the Atlantic.....	826
And thence to Liverpool.....	2,234
Total distance from Chicago to Liverpool.....	4,481
From Chicago to New York <i>via</i> Buffalo.....	1,411 miles.
viz : of Lake and River.....	1,059
Canal, (with 72 locks).....	352
Thence to the Atlantic.....	30
And thence to Liverpool 2,986 Geographical	
Miles or Statute.....	3,460
Total distance.....	4,901
From Chicago to New York, by way of Lake Champlain.....	1,619 miles.
viz : of Lake and River.....	1,505
Canal, (with 70 locks).....	114
Thence to Liverpool as above.....	3,490
Total distance.....	5,109

The time required by these routes, and allowing for the extra time in locking is 8 days between Chicago and Quebec, or (by Lake Champlain) to New York, and 15 days by the Erie Canal, which may be reduced to 10 days when steam is successfully introduced.†

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\* See Appendix.

† Objections may be raised against carrying the Western trade through a portion of Canada. These objections are of no account ; first, because there is so complete an identity of interest between the two countries that there can be no obstructions or onerous exactions made upon the passing trade ; and, next, because it could be avoided, if it should ever be necessary, by the Niagara and by the Oswego Ship Canals.

The cost of transport by steam propellers of a thousand tons, between Chicago and Quebec or New York, will be almost exactly the same; and, as before stated, will not exceed two mills per ton per mile, or ten cents a bushel for wheat.

To the cost of transport should be added the tolls on the artificial works on each route, necessary to maintain them in operation.

Direct trade with Europe, that is by loading upon the Lakes and crossing the ocean, has been a somewhat popular idea among those who have but little practical acquaintance with the navigation of either.

The build, draft and rig of the vessels suitable to the one are not so to the other.

The extra crew, stores, spars and equipment of the ocean vessels adds largely to the dead weight, and correspondingly reduces the paying weight, besides otherwise adding to the cost of transport.

The extra cost of the crew and of carrying this dead weight would pay many times over for the cost of transferring the freight at the seaboard.

## THE CAPACITY OF THE CHANNELS OF TRADE BETWEEN THE EAST AND WEST.

The statements which are published of the aggregate tonnage and mileage upon the canals and railways, furnish no adequate idea of the through traffic between the East and the West, nor of any fair comparison between that carried on land and water. Even the State Auditor's voluminous tables do not furnish this necessary information, and it is impossible to ascertain from them alone, the through tonnage of either the Erie or Champlain Canals in either direction.

For the second time in the discussion of this subject, this information is now furnished, as approximately correct as the case demands; and it is hoped that the labor of its compilation will be appreciated, and that it will hereafter be furnished by the proper public officers.

TABLE

*Of the Tonnage Carried by the Water and Railway Lines between the Food-producing West and the Consuming and Importing East, for One Year, viz. : 1871 or 1872 :*

CHANNELS OF TRADE.	THROUGH TONS.		
	Eastward.	Westward.	In both Directions.
The Erie Canal.....	2,637,212	450,000*	3,087,212
“ Welland Canal.....	.....	.....	1,250,000
“ New York Central Railway.....	.....	.....	2,250,000†
“ Erie Railway.....	893,685	369,196	1,262,881
“ Pennsylvania Railway.....	879,461	412,385	1,292,846
“ Baltimore and Ohio Railway....	.....	.....	790,275*
Total.....	.....	.....	9,933,214

\* Estimated.

† Supposed to be greatly in excess.

Twenty years ago, I ascertained that the agricultural exports from the West equalled in value the imports from the East, and in tonnage were as four to one. At the present time, when many of these agricultural products are condensed into flour, the products of animals, and spirits (to lessen the cost of transportation), the proportion of the tonnage between the Western exports and imports, of the same aggregate value, is probably as three to one. Thus, out of about seven millions of tons of freight, which accumulate at the eastern end of Lake Erie, there is bound East a little over five millions, and of this the Erie and Welland Canals probably convey three-fourths.

It is difficult to ascertain the actual tonnage of freight which has been carried upon the Lakes. The tonnage of the vessels has increased one-half since 1862, and the trade is now valued at a thousand million of dollars.\*

The introduction of steam, efficient management and low tolls, will enable the Erie Canal to increase its capacity from Buffalo, for through freight, and carry the local tonnage naturally belonging to it, to the extent altogether of four millions of tons per annum.\*

The Welland Canal, as now built, is capable of carrying an

\* See Appendix.

equal amount, say four millions of tons, and if a considerable portion of this is delivered at Oswego, it will increase the capacity of the Erie by a million of tons.

Three years hence the Welland Canal will be enlarged, and will then be able to carry from ten to twenty millions of tons. If a ship canal meanwhile is built from Oswego to the Hudson, it would be able to convey from five to ten millions of tons, in addition to its present business.

The railways, as now built, have carried from the Basin of the Lakes to tide water, four millions of tons, and may be tracked to give them twice that capacity.

The Welland, St. Lawrence, and Champlain route will be almost unlimited in capacity, and may be considered as equal to from ten to twenty millions of tons.

The Kanawha Canal, if built upon its present dimensions, would be equal to two millions, and properly enlarged, to five millions of tons.

We now have an aggregate capacity of transport between the Interior and the Atlantic seaboard by land and water, of nine millions of tons, and the means of increasing it to eighteen millions, by improvements, and to thirty millions of tons annually by new lines.

Is the present export demand from that portion of the West equal to, or greater than the present facilities of transport?

We have seen that the surplus productions of that region exceeds twelve millions of tons, and that the existing channels have a capacity of only seven millions eastward, and hence "the skeleton in the corn crib"—the burning of corn as a cheap fuel; the costly conversion and necessary condensation of the cereals into animals, their products and liquors.

The five millions of tons of surplus of the West which the present channels of transport cannot convey to market, would net to the producers two hundred millions of dollars a year, and as much more to the carriers, and again would increase the sales at the East, say chiefly at New York, by nearly four hundred millions of dollars.

The simple *annual increase* of the products of the West exceeds the present capacity of any one of the trunk railways. You cannot build railways fast enough to meet this increase.

Only one well acquainted with the Western country, and particularly with the extremities of the drainages of trade, "the frontiers of cereal cultivation," can appreciate, how much of the produce must be withheld from your markets for the want of transportation.

You must go with me into those extremities of cultivation to realize the annual loss, nay, even the destruction of what would enhance the whole business of New York more than ten per cent.

The population of the ten Western States has increased at the rate of four per cent. per annum for each of the last ten years, and of several of them, from five to eight per cent. per year.

The agricultural products requiring transport to the Atlantic, increase more rapidly than the population, and ten years hence will be twice as great as now, viz., more than twenty millions of tons, and if cheap, rapid and certain transportation is afforded, this tonnage will exceed twenty-five millions.

These Western surpluses which the existing channels through the United States cannot convey, will seek the St. Lawrence route and be forwarded to our great foreign food-customer, Great Britain, and with the loss of this trade, New York will also lose the sale of the goods which such Western products will purchase.

We have seen that the present production of that great West, whose trade belongs to you New Yorkers, is now nearly twice as great as the capacity of the existing channels of transport.

But it follows that when such channels are overcrowded, the charges for transport are correspondingly increased.

When I repeat that the actual *cost* of water transport in vessels of a thousand tons, from Chicago to New York in twelve days, is two mills per ton per mile, and you find that the Lake, Canal and Railway Companies compel you to pay three or four times as much, you will perceive why you must not only increase the capacity, but must cheapen the existing lines of trade, or open new and better ones if you desire to retain your supremacy as the great commercial city of the continent.\*

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\* The cost of labor and of all the materials which are consumed in transportation have increased year by year for several years past, while the charges for transport by the water and railway lines have been steadily reduced.

This is particularly the case with the competing trunk railway lines, and should be duly considered in these investigations.



The tables of the cost of transport by the usual conveyances, which I now exhibit to you, were very carefully prepared twenty years ago, and have been very extensively used at home and abroad.

I now submit them, changing the rates to correspond with the increased value of money and labor since 1852.\*

I am told at this place in my argument, that the days of canals and water transportation are concluded, and that the great traffic of the country is to be performed hereafter by the railways.

Nothing can be further from the truth. The business of the internal lines of commerce disprove the allegation, and show that the water lines do actually transport the great mass of the internal commerce of the country.

At Chicago, Milwaukee and Buffalo the receipts and shipments by water are from two to five times as great as by Railway, and at Montreal, Albany and New York are nearly ten times as much.\*

There is transported by water between New York and Albany or Troy, fifteen times as many tons of freight in the nine months of river navigation, as the railways carry in twelve months.

These enormous differences are only attributable to the economy and capacity of transportation by water as compared with Rail transport, and they can never be overcome by the latter method. Hence the prosperity of the East and the West, while depending upon cheap transport, must mainly rely upon the water lines to promote their mutual welfare.

A few days since I ascertained the usual charges for carrying freight between New York and sundry foreign ports.

To San Francisco it was by sail around the Horn (six times the distance by the Pacific Railway) but one-fifth the charge, or in a ratio of 30 to 1. That is, the charges for railway transport by the railway to the Pacific is thirty times the charge by mile by sailing vessels, and about fifteen times more than the cost by steam *via* Panama.

On the Hudson River the prices by water are one-fourth of those by rail *in the summer*, and one-sixth *in the winter*, when there is no water communication.

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\* See Appendix.

Often times the charge by railway (in the winter) from Albany to New York, equals that from New York to Liverpool.

The natural flow of the water from the Upper Lakes is through the St. Lawrence to the Sea.

Trade would naturally follow the same channel, if there were no human agencies to divert it.

The stormy and dangerous sea passages to Europe, from the mouth of the St. Lawrence, will to some degree lessen the exportation of breadstuffs by that route.

But there is no home demand or consumption in that region for the food productions of the West.

New York, on the contrary, is the depot for the manufacturing, mining and commercial population of the northern Atlantic seaboard, consuming twice as much of such articles as are exported, and therefore the great entrepôt is naturally at New York.\*

But when we consider that the Western products are now delivered on Lake Ontario, so as to compete with the Erie Canal at Buffalo, (and soon to be delivered considerably cheaper,) and that there is only 180 miles of river navigation to tide water (at Montreal), we will also begin to realize that no improvements of the Erie Canal from Buffalo can save to New York at least the diversion of the Exporting portion of the products of the West to foreign countries.

It is claimed by the Canadian authorities that the food imported from the West into New England (equal in quantity to that which is exported to foreign countries) can be delivered by the St. Lawrence route and the Gulf and coast vessels, cheaper than by the New York canals.

If these apprehended disasters were without a remedy to my native city, I would have hesitated in proclaiming it so publicly.

It has been the misfortune of our State, like that of all other communities, to have within itself diverse local interests, which swerve legislation and even public sentiment, from true principles.

Thus the Western portion of the State has, and will always, disapprove any diversion of trade by the way of Oswego; and both the western and middle portions will oppose diversion to

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\* See Appendix.

the Champlain route ; while the citizens of New York will favor any and all lines which will bring trade to their city.

The case in hand is, however, not alone of municipal consideration, but affects very deep interests in the State and in the nation.

The Federal Government, as the conservator of the interests of all our people, is called upon to restrain the present enormous diversion of trade into the Canadian markets.

Not by arbitrary power, or custom duties which would injure the interests of a vast portion of the Republic at the West, but by aiding (as in the Pacific Railways), commercial enterprise to give cheaper channels of transport and better markets.

Whether this shall be done by the President's proposed new water route from the Ohio southeastward, or by the Kanawha Canal to Norfolk, or (if the State and citizens of New York refuse), by the Lake Champlain or Oswego Ship Canal routes, remains to be determined.

I may safely say to my fellow-citizens of New York, that the vast interests involved in this question in the strong-growing and soon to be dominant western interior, will demand and effect the desired objects above stated.

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NOTE.—In the preceding pages I have stated the quantities in round figures for oral delivery.

In the printed copy and in the Appendix will be found the correct amounts.

I am greatly indebted to the officers of the Board of Trade at Chicago, Milwaukee, Detroit, Cleveland, Cincinnati, St. Louis, Buffalo, Oswego, Montreal, and the corresponding organizations in the Atlantic Cities, for information furnished either directly or through personal friends, not merely of printed matter, but of manuscript information of great value.

The Federal Departments of Agriculture and Statistics have also furnished manuscript and printed matter of value.

The Trunk Railway Companies have also, on application, furnished all the information asked for.

Other information has been furnished by personal and professional friends, to whom due credit will be given.

The appendix also contains some data and statistics on subjects which have purposely only been slightly discussed in the preceding address. They were collected with considerable labor, and will be useful for a further examination of the questions referred to, and have therefore been added for the benefit of others.

## APPENDIX.

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EXTRACTS FROM WM. J. McALPINE'S REPORT TO THE LEGISLATURE OF NEW YORK, FOR 1852,

### ON TRANSPORTATION.

"An investigation of the comparative advantages of the several channels of communication between the sea-board and the interior requires an examination into the *cost and charges* of transport by the various modes of land and water conveyance."

"The CHARGES cannot be relied upon in this investigation because they fluctuate on the various routes, and on the different articles conveyed; competition reducing them to a minimum and monopoly raising them to a maximum."

"The cost, however, furnishes a more reliable basis for comparison, as the elements upon which it depends are usually affected alike on the different routes."

"These elements consist of loading, conveying, discharging, warehousing, insurance, and in artificial channels, the necessary expenses of maintainance and cost of construction."

\* \* \* "The cost of movement on a Canal depends upon the relative sectional areas of the boat and of the Canal, upon the actual size of the two, and upon the elevation (or depression) to be overcome." The cost of movement upon a Railroad depends upon the elevation to be overcome, the rate of its gradient, the curvature, and the limited capacity in comparison with the cost."

\* \* \* "In arriving at the general results, (the actual cost of transport by each mode of conveyance, applied to the several lengths of each on the channels of trade between the interior and the sea-coast,) it will not be necessary to regard fluctuations of trade and commerce tending to increase or diminish the cost of transport which are of only a temporary character."

"The following table shows the distances by sailing vessels, and the ordinary *charges* from American Ports to England, etc.

\* \* \* The COST may be assumed at two-thirds of these charges."

TABLE OF CHARGES.

FROM	1851.	TO LIVERPOOL.			TO HAVANA.			TO RIO JANEIRO.		
		Miles.	Per Ton.		Miles.	Per Ton.		Miles.	Per Ton.	
			Voyage.	Pr Mile.		Voyage.	Pr Mile.		Voyage.	Pr Mile.
			Dolls.	Mills.		Dolls.	Mills.		Dolls.	Mills.
Quebec.....	2910	\$11.00	3.75	1960	.....	.....	6010	.....	.....	.....
Boston.....	3020	5.25	1.74	1480	\$4.00	2.70	5310	\$4.00	0.75	.....
New York.....	3150	5.00	1.60	1250	3.00	2.40	5240	4.00	0.76	.....
Philadelphia...	3295	5.50	1.70	1220	4.00	3.27	5000	5.00	1.00	.....
Baltimore.....	3530	5.75	1.60	1215	5.00	4.11	5000	6.00	1.20	.....
Richmond.....	3395	6.00	1.70	1170	5.50	4.70	5000	6.00	1.20	.....
New Orleans...	4755	7.50	1.60	595	4.00	6.72	6555	7.00	1.06	.....

A statement given to me in May, 1873, by one of the largest shipping houses in New York, for the average fair charges by sail from New York to Liverpool, was \$6.25 per ton for grain, beef, pork, etc., and returning \$3.75 per ton, chiefly Iron. The charge by steam is one-third greater.

The distance is 3,442 statute miles, making the present average charge nearly  $1\frac{1}{2}$  mills per ton per mile by sail, and 2 mills by steam.

The charges by sail to Valparaiso ( 12,000 statute miles) is \$11 out and \$20 returning, equal to  $1\frac{1}{3}$  mills per ton per mile.

The charges by sail to San Francisco, around Cape Horn, (16,000 statute miles) is on coal \$10 per ton of 2,240 pounds, and general freight \$12, equal to  $\frac{2}{3}$  of a mill per ton per mile on coal, and  $\frac{3}{4}$  on other freight.

The charge by steam from New York, *via* Panama to San Francisco, (6,100 statute miles) is about the same as by sail around Cape Horn, equal to  $\frac{1}{3}$  of a mill per ton per mile on goods, freight delivered in 30 days. The time by Cape Horn is from 100 to 120 days.

The charge by Railway from New York to San Francisco, 3,400 miles, on general freight, is from \$60 to \$150 per ton, equal to from 18 to 45 mills per ton per mile.

The charge from Montreal to Liverpool averaged \$6 per ton by sail, and \$8 by steam, equal to  $1\frac{1}{2}$  and  $2\frac{1}{2}$  mills per ton per mile.

*Table of the Cost of Transport per ton per mile from Wm. J McAlpine's Report for 1852.*

Ocean, long voyages (3,000 miles and more).....	1	mill.
“ short voyage (2 mills for 1,000 to 1,500 miles) from 2 to 4	4	“
Interior Lakes, long voyage, 1,000 miles and more....	2	“
“ short “ 500 “ “ less....	3 to 4	“
Rivers, similar to the Hudson.....	2½	“
“ similar to the St. Lawrence and Mississippi...	3	“
“ Tributaries.....	5 to 10	“
Canals, Erie enlarged.....	4	“
“ other large Canals, but shorter.....	5 to 6	“
“ of the ordinary size.....	5	“
“ “ “ with great lockage.....	6 to 8	“
Railroads, transporting Coal (and other fixed business).	6 to 10	“
“ for the usual traffic with favorable grades.	12½	“
“ with steep grades, irregular traffic, etc....	15 to 25	“

These rates, when applied to the several routes and conveyances, must be increased to pay for maintainance and interest. On the Erie Canal this was assumed at one dollar a ton.

The increase in the value of labor and materials required in transportation and in the value of money, between 1852 and 1873, has been from one-fourth to one-third.

The *charges* for grain, etc., by sail on the Lakes in 1873, were 5 mills per ton per mile, and by steam 6 mills; and by Erie Canal 6 mills. At the same time the charges by Railway from Chicago to New York were 10 mills in the Summer, and 14 in the Winter.

The average *charges* by Railway from Chicago to Buffalo for the whole season, and for all classes of freight, were 2.43 cents per ton per mile in 1868; 2.34 cents in 1869; 1.5 cents in 1870; 1.39 cents in 1871 and  $13\frac{7}{10}$  mills per ton per mile in 1872.

Hon. Samuel B. Ruggles, in 1869, prepared with great care, a table of the cereals annually produced by each country of Europe and by the United States.

The following is an abstract :

COUNTRY.	POPULATION.	TOTAL PRODUCT, IMP. BUSHELS.	RATIO OF BUSINESS TO POPULATION.
Russia.....	63,883,867	1,484,437,500	21.2
Germany.....	38,768,291	664,411,100	17.1
France.....	38,954,782	717,215,996	18.3
Austria and Hungary.....	35,444,876	571,254,765	16.1
Great Britain.....	30,380,787	380,887,930	12.5
Sweden, Norway, Low Countries..	18,813,625	244,517,511	13.
Italy, Spanish Peninsula.....)	63,877,665	691,791,799	10.9
Danubian Provinces and Turkey.)			
Total of Europe.....	296,123,293	4,754,516,604	16.
United States in 1868.....	39,000,000	1,405,449,653	36.

## STATISTICS OF THE TEN WESTERN STATES.

The Cereal Crop of the whole of the United States in 1871 was fifteen hundred millions of bushels, or nearly forty millions of tons.

The ten Western and North-western States produced in that year more than a thousand millions of bushels, or twenty-five millions of tons, valued at home at five hundred millions of dollars.\*

The neat cattle within these ten States amount to five millions, and the swine and sheep to thrice that number, aggregating three and a half millions of tons, more than one-fourth of which reach the Atlantic markets, chiefly that of New York.†

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\* The tables from which this estimate is derived, show that the value of the grain lessens rapidly as the farms are more remote from the navigable waters. Corn is valued at 25 to 29 cents in Iowa and Nebraska, and 59 cents per bushel in Michigan, and wheat is valued at 90 cents in the former and 132 cents in the latter.

While the whole producing West is deeply interested in cheapening the cost of transportation between the main water lines and the "Cereal frontier" sections, where the demands of new emigrants and Railway constructors have ceased, it has become a question of life or death to secure not only cheap transport to the great water lines, but also the cheapest through lines.

† In 1872 there were nearly five million Hogs slaughtered and packed for Export from the West, amounting to five hundred and fifty thousand tons.

The cereals *shipped* from the Western Lake ports amount to one hundred and fifty millions of bushels, and by railway, probably fifty millions more.

The cereals *received* at the lower end of Lake Erie by lake is probably eighty-five million bushels, and by railways forty-five millions. The *shipments* by the Erie Canal are fifty million bushels, and probably half that quantity by the Central and Erie Railways.

The amount of cereals *received* at the Atlantic cities is one hundred and sixty millions of bushels, and that exported to foreign countries, chiefly from New York to Great Britain, is one hundred millions of bushels.

The following receipts and shipments of tons of Flour and Grain were made in 1872, from the Lake and Ocean ports :

	<i>Tons Received.</i>	<i>Tons Shipped.</i>
Chicago.....	2,110,000	2,110,000
Milwaukee.....	630,000	600,000
Detroit ....	300,000	270,000*
Toledo.....	630,000	560,000
The small Ports and Railways.....	1,300,000*	1,200,000*
<b>Totals .....</b>	<b>4,970,000</b>	<b>4,740,000</b>
Buffalo.....	2,800,000	2,320,000*
Oswego, Lake, Canal, Railway.....	260,000	250,000*
Ogdensburg and Toronto.....	180,000	160,000
The small Ports.....	120,000	100,000*
The Welland Canal and Railways.....	700,000	650,000*
<b>Totals.....</b>	<b>4,060,000</b>	<b>3,480,000</b>
		<i>Exported.</i>
Montreal.....	440,000	400,000
Boston.....	420,000	100,000
New York, (Received by Railways 800,000 tons)...	2,260,000	1,950,000
Philadelphia.....	600,000	180,000
Baltimore.....	460,000	270,000
<b>Totals.....</b>	<b>4,180,000</b>	<b>2,900,000</b>

The differences between the receipts and shipments embrace the home consumption, and also diversions to a smaller class of routes than those expressed in the Tables.

The receipts at Chicago for live Cattle, Sheep, Hogs and Meats, were five hundred thousand tons, and the shipments three hun-

\* Estimated.



dred thousand tons, nearly all by railway. The receipts at Buffalo were two hundred and seventy thousand tons, and the shipments two hundred and thirty thousand tons, all by railway.

There were more than seven hundred thousand live cattle received at the Atlantic cities in 1871, and thrice that number each of swine and sheep.

The tonnage of the exports to foreign countries in 1872 of the product of animals, from the Atlantic ports, was as follows :

From Boston .....	37,000 tons
“ New York.....	254,000 “
“ Philadelphia.....	1,500 “
“ Baltimore.....	8,500 “
Total.....	301,000 “

RECEIPTS AND SHIPMENTS BY WATER AND RAILWAY,  
SHOWING THE PROPORTION OF EACH AT VARIOUS PLACES.

	<i>Tons Receipts.</i>	<i>Tons Shipments.</i>
Chicago { Of all articles by the four railways....	1,430,726	2,077,055
“ “ “ Lake*.....	2,965,402	1,847,240
Totals.....	4,396,128	3,924,295
Milwaukee { Of Flour and Grain by railway....	800,000	almost none
“ “ “ Lake.....	almost none	800,000
Montreal { Of Flour and Grain by railway.....	90,000	23,000
“ “ “ canal and river	356,000	368,000
Totals.....	446,000	391,000

In regard to the present charges for transportation by water and railway, Mr. Randolph, of the Board of Trade, Chicago, says :

“ It must be conceded that the most effectual competition is that furnished by an unrestricted and free water route. No better illustration of this can be afforded than the fact that the business of grain carrying from Chicago to Buffalo by lake is profitable at six cents per bushel, while railroad companies claim it is

\* This Lake tonnage (4,812,642 tons), would require 25,000 cars and 600 locomotives to haul it from Chicago to Buffalo, based upon the actual work done by the cars and engines in 1872, provided it could be hauled regularly throughout the year ; this would be impracticable, and therefore it would require three times as many locomotives and five times as many cars as the Lake Shore Railway now uses to perform the lake business between Chicago and Buffalo, and these numbers must again be increased one-half to provide for the business from the other lake ports.

not remunerative from Chicago eastward, *an equal number of miles*, at less than from three to five times that sum.

"From the inadequacy of the existing lines, and the doubtful success of improving them \* \* \* negotiations with the Government of Canada to secure to us by their improvements (have been made) \* \* \* with an easy transit for our largest lake vessels to the foot of Lake Ontario, or to the ocean (*via Montreal*), our freight rates would be largely reduced."

The charges for the freight of wheat from Chicago to Buffalo *by sail* was 15 cents per bushel, or 6 mills per ton per mile; *by steam* was  $16\frac{1}{2}$  cents, or 7 mills, and *by all rail* to New York, etc., in summer, ten mills, and in winter, 14 mills per ton per mile.

For transporting corn, 14 cents per bushel *by sail*, or 5 mills; 15 cents *by steam*, or  $6\frac{1}{2}$  mills per ton per mile, and on the *Erie Canal*, 11 cents, or 11 mills per ton per mile.

The average charges for carrying grain *by sail* from Montreal to Liverpool is 74 pence for 480 pounds, equal to \$8.50 per ton, and *by steam*, 81 pence, or \$9.25 per ton. The average for flour is 33 pence *by sailing vessels*, and 36 pence *by steamers*.

The average passages of the steamers from Montreal to Liverpool is eleven days, and returning is ten days.

#### TONNAGE NEW YORK CANALS.

CANAL.	Total Tons, 1872.	Total Tons, 1871.
Erie.....	3,562,560	3,580,922
Champlain.....	1,449,528	1,099,995
Oswego.....	832,490	941,858
	5,844,578	5,622,775
The Laterals.....	828,792	845,113
Total.....	6,673,370	6,467,888

The total mileage of *all the freight on all of the canals of the State* in 1871, was 1,050,104,125, which makes an average of 161 miles distance for each ton. The mileage for 1872, was 1,048,575,911, making an average distance moved of 156 miles. The report for 1872 is not yet printed in detail, but the figures of 1871 do not differ enough to affect the purpose of the present investigation,

and will therefore be used to determine the general results desired, and by using round numbers instead of the exactly copied figures.

The average rate of tolls on the Erie Canal for 1871, is almost exactly three mills per ton per mile. The total amount received for tolls is \$2,355,986, and the number of tons 3,580,922, giving a total mileage of 785,328,667, and an average distance of each ton hauled of 219 miles.

The through tonnage of the Erie Canal is estimated at 2,200,000 and of the Champlain 550,000 tons.

The tonnage which passed the Sault St. Marie Canal in 1872, of the principal articles, was 465,000 tons East, and 84,000 West; on the Welland Canal East, was 1,100,000 tons, and West 339,060 tons; and on the St. Lawrence Canal was 750,000 tons East and 162,268 tons West.

#### ANALYSIS OF THE BUSINESS OF THE TRUNK RAILWAYS.

	<i>New York Central.</i>	<i>Erie.</i>	<i>Penn'a.</i>	<i>Baltimore, and Ohio.</i>	<i>Lake Shore.</i>
Length of Trunk Line, Miles. ....	442	459	358	379	540
Cost in millions of dollars	63	109	42	39	84
Number of Locomotives.	447	488	.....	383	418
" applied to freight,	230*	250*	.....	311	250*
" of freight cars. ....	10,983	10,638	10,000*	8,251§	8,637
Mileage of the freight trains. ....	7,911,257	9,004,051	.....	7,121,795§	600,000,000*
Mileage of the freight. ....	1,020,908,885	950,708,902	1,187,107,000	910,855,695	.....
Tons of freight carried. ....	4,393,965	5,564,274	7,844,778‡	4,000,000*	4,382,243
Through freight East, tons. ....	.....	893,685	879,461	750,000*	.....
Through freight West, tons. ....	.....	369,196	412,385	300,000	.....
Through freight in both directions, tons. ....	2,250,133	1,262,881	1,291,846	1,050,000	.....
Average load per train reported, tons. ....	250	220	.....	.....	.....
Average load per train, calculated, tons. ....	127†	105†	.....	.....	130*
Average distance freight was moved, miles. ....	230†	170†	152†	150†	208
Average distance of way freight, miles. ....	.....	.....	.....	.....	.....
Average rate charged per ton per mile, cents. ....	1.67	1.52	1.42	.....	1.37
Mileage of engines per annum. ....	34,000	36,000	.....	30,000	33,000
Mileage of cars per an- num. ....	.....	.....	.....	.....	17,000

† Calculated. \* Estimated. ‡ Including 3,669,071 tons of coal, and excluding 614,757 tons of fuel for Company's use. § Includes mileage of 72 passenger engines.

## DIMENSIONS OF VARIOUS CANALS.

NAMES.	Length.  Miles	Width of		Opened.  Year.	Locks.					
		Surface	Bottom.		No.	Length Feet.	Width Feet.	Depth Feet.	Rise Feet.	Fall Feet.
		Feet.	Feet.							
CANADIAN.										
Lachine.....	8½	120	80	1848	5	200	45	16 & 9	45	.....
Beauharnois.....	11¼	120	80	1845	9	200	45	9	82	.....
Cornwall.....	11¾	150	100	1843	7	200	55	9	48	.....
Galops.....	1	90	50	1847	1	200	45	9	4	.....
".....	2	4	90	50	2	200	45	9	12	.....
".....	3	7½	90	50	3	200	45	9	16	.....
	43½	.....	.....	.....	27	.....	.....	.....	207	.....
Welland.....	27½	70	40	1846	27	150	26½	10½	330	.....
Rideau Route.....	133	80	60	1832	59	134	33	5	356	177
Richelieu.....	12	60	36	1843	9	118	23	7	.....	.....
Welland Enlarged.....	30	150	100	1873	25	270	45	12	330	.....
UNITED STATES.										
Sault St. Marie.....	200	150	.....	2	350	70	12	19	.....	.....
New York Canals.....	513	40	28	1825	338	90	15	4	2	310
Erie Enlarged.....	352	70	52	1862	72	110	18	7	6	55
Delaware and Hudson.....	108	44	26	.....	167	100	15	6	9	50
Delaware and Raritan.....	43	75	54	.....	18	220	24	7	1	16
Delaware and Chesapeake.....	14	66	42	.....	4	220	24	8	.....	.....
Albamarle and Chesapeake.....	14	125	100	.....	.....	220	40	7	.....	.....
Chesapeake and Ohio.....	191	70	52	.....	.....	.....	.....	6	6	.....
Kanawha.....	147	40	28	.....	.....	100	15	4	1	916
Illinois and Michigan.....	102	60	42	.....	2	.....	.....	6	.....	20

## DISTANCES FROM CHICAGO TO THE ATLANTIC.

FROM	TO	Miles.				Locks.		Total Miles.		
		Lake.	River.	Canal.	Total.	No.	Lockage.	Quebec.	New York.	
									Via Buffalo	Via Cham- plain.
Chicago.....	St. Clair River..	637						637		
St. Clair.....	Amherstburg..		51					51		
Amhurstburg.....	Buffalo.....	237						220	925	908
Buffalo.....	Albany.....			352		72	655		352	
Albany.....	New York.....		148						148	
Colburne.....	Dalhousie.....			30		25	330	30		
Dalhousie.....	Kingston.....	160				27	207	160		190
Kingston.....	Montreal.....		134	44				178		168
Montreal.....	Quebec.....		160					160		
Canghawaga.....	St. John.....			30		2	19			30
St. John.....	Rouse's Point..		23							23
Rouse's Point.....	Whitehall.....	111								111
Whitehall.....	Fort Edward....			24		4	54			24
Fort Edward.....	Troy.....		42	& Canal		11	150			42
Troy.....	New York.....		155							155
The Route via Oswego with a Ship Canal, will be as follows :										
Chicago.....	Dalhousie.....	637	51		688					
		220			220					
				30	30	25	330			
Dalhousie.....	Oswego.....	130			130					
Oswego.....	Albany.....	16		178	194	67	607			
Albany.....	New York.....		148		148					
Add for Lockages, one mile to each					1410					
					92			52	72	69
Totals.....					1502			1468	1497	1720
Quebec Route is.....		1017	345	74	1436					
Buffalo and New York Route is ..		874	194	352	1425					
Oswego " " " " ..		1003	199	208	1410					
Champlain " " " " ..		1128	405	118	1651					

The time required by each route, at the rate of 8 miles an hour on the Lakes, 6 on the Rivers, 4 on the Ship Canal, and 3 on the Erie Canal, will be as follows: and also the cost per ton per mile, at  $1\frac{1}{2}$  mills on the Lakes, 2 on the Rivers, 4 on the Ship Canals and 6 on the Erie Canal, will also be as follows:

	<i>Miles.</i>	<i>Hours.</i>	<i>Cost per ton.</i>
1. Chicago to Quebec—Lake Navigation.....	1017	115	\$1.53
“ “ River “ .....	345	58	69
“ “ Ship Canal .....	74	18	30
“ “ 52 Locks.....	52	13	21
Totals.....	1488	204	\$2.73
2. Chicago to New York } Lake Navigation....	874	110	\$1.31
via Buffalo, } River “ .....	199	33	40
By steam, Erie Canal.....	352	117	2.11
72 Locks.....	72	12	43
Transferring Cargo..	....	24	25
By horses on Erie 17 days. Totals.....	1497	296	\$4.50
3. Chicago to New York, } Lake Navigation..	987	124	\$1.48
via Oswego and Erie Canal, } River “ .....	199	33	40
Welland and Erie Canals..	234	78	1.40
92 Locks.....	92	16	55
Transferring Cargo.....	....	24	25
Totals.....	1512	275	\$4.08
With a Ship Canal from } Lake Navigation.....	1003	125	\$1.50
Oswego to Albany. } River “ .....	199	33	40
Ship Canal.....	208	52	83
92 Locks.....	92	23	37
Totals.....	1502	233	\$3.10
4. Chicago to New York, } Lake Navigation.....	1128	141	\$1.69
via Lake Champlain. } River “ .....	405	68	81
Ship Canal.....	118	29	47
69 Locks.....	69	17	28
Totals.....	1720	255	\$3.25

## HUDSON, CHAMPLAIN AND ST. LAWRENCE SHIP CANALS.

The State Engineer of New York in 1866 was directed to make an examination for a slack water navigation from Troy to Fort Edward, and thence to Lake Champlain by a Canal suitable for gunboat locks of 225 feet length and 25 feet width.

The Report of the State Engineer and of Mr. McElroy were submitted to the Canal Board in 1867, from which the following extracts are made :

The distance from Troy to Fort Edward is 39 miles, and a rise of 116 feet above tide-level in the Hudson River. At two miles is the summit of the Canal, 31 feet higher and 21 miles further (Whitehall) with a fall of 50 feet, is the entrance to the Lake, which is 97 feet above tide. The Lake is 110 miles long to Rouse's Point, and 23 miles further to the Sorel River to St. Johns, the commencement of the proposed Caughnawaga Canal, and by that Canal 30 miles to the St. Lawrence River, (ten miles above Montreal.)

The Engineer proposes to construct the slack water navigation of the Hudson River from Troy to Fort Edward with eleven locks and dams at a cost of \$2,360,079.

The Ship Canal to Whitehall will have 8 locks of 84 feet lockage, and cost \$2,110,632. Making the whole cost from Troy to Lake Champlain, including the feeders, \$4,534,379.

The supply of water would be abundant, having the whole of the North River above Fort Edward to furnish it.

In 1855, the Government of Canada requested John B. Jervis to survey and estimate the cost of a Canal from the St. Lawrence to Lake Champlain, 28 miles long.

His report of that year states that such a Canal could be made for not exceeding from \$3,287,240 to \$4,267,890, depending upon the route which is adopted.

This Canal was estimated for a surface of 150 feet and depth of 11 feet, with locks 230 feet, chamber 36 feet wide.

Mr. Jervis remarks : " Some collateral channel will soon (after 1855) be required." \* \* " I have not doubted that the Erie Enlarged Canal will prove insufficient."

The time is not distant when they (New York and Canada) will have four, five, or six millions of tons to divide, *and the end of increase is not yet.* \* \* \* " Nature has settled the question, and no other route can divert this trade, provided they have their proper and obvious improvements." \* \* \* " Whether by the State of New York or by an incorporated Company, the suit-

able improvements of the New York Champlain Canal, is a work that must be done; it is only a question of time."

In 1869, the late John B. Mills made a survey of the Caughnawaga Ship Canal for vessels of 500 tons, and estimated it would cost \$2,979,240.

There is now a Canal from the St. Lawrence, forty miles below Montreal, to Lake Champlain, by which vessels of 230 tons pass.

Twice the amount of the estimates for the Champlain and Caughnawaga works, say fifteen millions of dollars, would be ample for Canals suitable for vessels of a thousand tons, and for improving the upper end of Lake Champlain.

The Hudson River from the mouth of the Erie and Champlain Canals to Hudson City, should be improved for vessels of twenty-five feet draft by the Federal Government.

The "FIVE POWERS" of Europe have deepened the Danube into the Black Sea from 12 to 22 feet.

The United States Government are annually deepening the Mississippi at the Gulf at the rate of one foot a year.

The Corporation of Glasgow has deepened the Clyde from 8 to 25 feet, and that of Montreal has deepened the St. Lawrence from 12 to 22 feet. Numerous other examples can be offered to demonstrate what every modern Engineer will admit, viz.: that this portion of the Hudson River can be improved to give a permanent channel in the lowest water of twelve feet depth, at a moderate expense, and that this can be increased to twenty feet depth if it shall become necessary. About a million and a half of dollars have been expended on this part of the River, and has secured a depth of nine feet. The United States Government are expending about \$150,000 a year in improving and extending these works, and if the Ship Canal should be commenced immediately, by the time it could be completed the channel of the Hudson below Troy would be permanently deepened to ten feet, and would float a vessel of a thousand tons, except at times of very low water.

A million of dollars thus expended, would give a permanent channel of at least twelve feet depth, and when required, this expenditure should be made by the Federal Government, as it would be almost wholly for inter-State benefit.

## DEPTH OF WATER IN THE HARBORS OF THE INLAND LAKES.

HARBORS.	<i>Highest.</i>	<i>Lowest.</i>	<i>Ordinary.</i>	<i>Attainable.</i>
Sault St. Marie.....	12 $\frac{1}{2}$	12	12	14
Green Bay.....	13	11	11	13
Milwaukee.....	15	13 $\frac{1}{2}$	14	14
Chicago.....	16	13 $\frac{1}{2}$	14	14
Grand Haven.....	22	17	19	19
Goderich.....	12	11	11	—
St. Clair Flats.....	14 $\frac{1}{2}$	13	14	—
Detroit.....	21	18	18	—
Toledo.....	11 $\frac{1}{2}$	8	10 $\frac{1}{2}$	—
Sandusky.....	13	10	13	—
Erie.....	14	12 $\frac{3}{4}$	14	—
Buffalo.....	22	8	14	—
Colborne.....	18 $\frac{3}{4}$	10	13	14
Dalhousie.....	16	10 $\frac{1}{2}$	13	—
Hamilton.....	17	15	14	14
Niagara.....	22	20	20	—
Toronto.....	15 $\frac{1}{2}$	12 $\frac{1}{2}$	13	14
Oswego.....	23	18	—	—
Kingston.....	18	12	12	14

The above Table, and some parts of other Tables in this Appendix, have been copied from the Reports of the Canal Commissioners and Minister of Public Works of Canada.

DATES OF THE OPENING AND CLOSING OF THE WATER LINES.  
AVERAGE OF TEN YEARS.

LINE.	<i>Dates of Opening.</i>	<i>Closing.</i>	<i>Duration, Days.</i>
Saint Paul—Mississippi.....	April 14	Nov. 22	222
Sault St. Marie—Lake Superior.....	" 28	Dec. 8	224
Mackinac.....	" 21	" 2	225
Illinois Canal.....	March 26	Nov. 9	228
Detroit River.....	" 31	Dec. 21	266
Toledo—Lake Erie.....	April 5	" 10	249
Buffalo, do.....	" 18	" 10	236
Welland Canal.....	" 15	" 14	243
Erie Canal.....	" 18	" 12	236
Oswego—Lake Ontario.....	" 3	" 16	257
Hudson.....	" 3	" 16	257
Montreal—St. Lawrence River.....	May 1	Nov. 30	213
Quebec.....	April 26	Dec. 5	223

ABSTRACT OF REPLIES to questions of the Canal Commissioners of Canada, by Boards of Trade and Forwarders in 1874, giving the results of the best opinions thereon:

1. The locks of the Welland Canal should be enlarged to a length of 250 to 300 feet, a width of 35 to 40 feet, and a depth of water of 14 feet.



The opinions from those places having shallow harbors are in favor of 12 feet depth.

2. The Boards of Trade of the Upper Lakes recommend vessels of 1,000 to 1,500 tons as the best adapted to carry produce from Chicago, etc., to ports on Lake Ontario with the greatest economy. Several persons recommend vessels of not exceeding 800 tons.

Steam propellers are found almost as economical as sail vessels, regard being had to the greater number of trips which they can make.

5. If the Welland Canal was enlarged to the capacity of the largest vessels now in the trade between Chicago and Buffalo, (1,200 to 1,500 tons) it would reduce the rates of freight between Chicago and the lower end of Lake Ontario 25 per cent.

12. Taking into the account, time, insurance and interest as elements of cost, steam vessels (propellers) cannot carry freight on this route as cheaply as sail vessels.

Yet both are necessary to meet the strong competition of the short line Railways.

F. G. Holcomb, of Toronto, states that the theory of practical men is, "that a vessel, to be profitable, should have at least one ton of cargo capacity for each mile of the route it is designed for."

The larger the vessels within the above limit the less will be the proportionate cost. "For instance, the only difference in a vessel of 10,000 or 20,000 bushels will be one or two additional men."

Transport by steam costs less, if there is quick dispatch; (that is, in loading, unloading, lockage, etc.)

13. What is the cost and daily working expenses of sailing and steam vessels of 500 and 1,000 tons capacity?

IN DOLLARS.

AUTHORITY.	COST OF SAILING VESSELS.				COST OF STEAM VESSELS.			
	500 TONS.		1000 TONS.		500 TONS.		1000 TONS.	
	<i>Vessels.</i>	<i>Daily Expense</i>	<i>Vessels.</i>	<i>Daily Expense</i>	<i>Vessels.</i>	<i>Daily Expense</i>	<i>Vessels.</i>	<i>Daily Expense</i>
BOARD OF TRADE.								
Chicago.....	30,000	40	40,000	48	50,000	130	80,000	190
Milwaukee.....	25,000	50	40,000	70	50,000	100	80,000	125
Detroit.....	25,000	25	45,000	35	45,000	100	75,000	120
Oswego.....	25,000	60	60,000	100	45,000	120	75,000	160

1. The general opinion of the Montreal merchants and forwarders is that the produce from the Western States can be transported the cheapest in large vessels to the east end of Lake Ontario, and thence to Montreal by transfer (of grain) into barges.

Mr. Stuart, of Detroit, says: "There is no kind of transportation that can compare with that by barges."

The gentlemen of Chicago and other places West, and some of those of Oswego, agree in the above opinions.

Others assert that when the Welland Canal is enlarged to convey vessels of 1,000 to 1,500 tons, it will be much cheaper to convey the cargo directly to the side of the sea-going vessel.

In reply to one of the interrogatories of the Commissioners, it was said, "By turning the Canals into mill-races, the difficulty in navigating all of the Canadian Canals is greatly increased."

It is an evil which has been experienced everywhere to attempt to use Canals for mill purposes and for navigation. In the State of New York immense sums have been directly and indirectly paid to disconnect the Canals from the hydraulic powers.

As soon as the Welland and St. Lawrence Canals are used toward their full capacity, it will be necessary to buy out all of the water powers, or to build independent works for one or the other.

9. "Vessels adapted for the Ocean are too heavy, too costly, and in many other respects wholly unfit for economically navigating the Interior Lakes."

"They are too heavy in frame, masts and rigging, and too difficult to move and control in the rapids, and in entering and passing through the Canals."

All of the correspondents agree that it would be inadvisable to have the same craft navigate the Lakes and the Ocean.

The Board of Trade of Toronto says: "Iron is now received from the Ocean ships in Quebec, and laid down in Chicago for \$350 per gross ton by water even with our present imperfect facilities," (less than  $2\frac{1}{2}$  mills per ton per mile). "It is well understood that the *cost of haulage* on a Railway for the same distance is at least \$10 per ton, and therefore it is impossible for the rail to compete successfully with water."

In regard to the proposed Canal from Georgian Bay (Lake

Huron) to Lake Ontario, the Commissioners say: "In view of these incontrovertible statements, it must be apparent to any impartial judgment even admitting it to be physically possible, that the cost of such a project would be so great as to render it commercially worthless."

The correspondents say: "It could not pay simple interest on its construction." As a self-sustaining Canal it is impracticable.

"It is a wild, impracticable project; it could never pay. No time would be saved over the Lake Erie route."

3. Interrogatory: "It takes from 20 to 30 minutes to pass the locks of the Welland Canal, and 20 hours for steam and 30 hours for sail vessels to go through the whole Canal."

"The time which would be occupied in locking through the Georgian Bay Canal would be three or four days, and therefore *no time would be saved* over the Lake Erie route, and the extra expense of navigating on a Canal would, even with very moderate tolls, exceed that of the Erie route."







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